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Determinants of foreign direct investment in Spain

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ABSTRACT

This study utilizes panel data as a means of examining the determinants of foreign direct investment (FDI) in Spain. Data that takes in the period 1993 to 2002 is used in order to estimate the determinants of FDI, at the sectoral level, by differentiating the manufacturing sectors, and at the regional level. The analysis investigates the sectoral, regional and macroeconomic variables that have successfully attracted FDI inflows from those that have not. Empirical results suggest that the differential between labour productivity and the cost of labour has been an important determinant of FDI in Spain during the period 1993-2002. Factors related to demand, the evolution of human capital, the export potential of the sectors, and certain macroeconomic determinants that measure the differential between Spain and the European Union average, also play a very important role in attracting flows of FDI. Certain policy issues that are relevant to the results are also discussed.

Running Title: Determinants of Foreign Direct Investment in Spain
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1. INTRODUCTION

Foreign Direct Investment (FDI) has been instrumental in shaping the dynamic of the globalization process within different economies and the Spanish economy has been no exception. FDI, besides having important implications in terms of a country's balance of payments, also affects the productive structure of the country receiving the investment, its business organization, potential technological change and innovation and the geographical distribution of production and employment. It would seem important from an empirical perspective therefore, to be able to establish and analyze those factors that have played a key role in determining FDI in Spain.

A review of the literature that focuses on the determinants of Spanish FDI, reveals that most empirical research have focused on the study of macroeconomic variables and have used aggregate data for the whole of the Spanish economy (Varela and Rodríguez de Pablo, 1974; Donges, 1976; Felipe and Fernández, 1991; Bajo, 1991a; Bajo and Sosvilla, 1991; Bajo and Sosvilla,1992; Muñoz, 1999). From the early 1990's onwards however, this type of study has also been carried out on a regional level (Egea and López, 1991b; Díaz, 2001).

This paper investigates the determinants of FDI in Spain by simultaneously examining macroeconomic, sectoral and regional factors. The present study also incorporates a wider range of factors than those that have previously attempted to analyze FDI in Spain. The paper is organized as follows. Section 2 both reviews and explains some of the methodological issues related to the modelling of FDI determinants. Section 3 contains the empirical analysis. The final section provides some conclusions and policy recommendations.

2. METHODOLOGY

The methodology most frequently adopted when analyzing the factors that determine foreign investment is conditioned by the fact that the agents of this investment are firms. The works of Barrell and Pain (1991), Stevens and Lipsey (1992) or Bajo and Sosvilla (1992, 1994) provide sturdy foundations upon which to base a theoretical model. The above studies suggests the following relationship between FDI (at any given moment in time) and its determinants:

$$IED_t = h(D_t, C_t, B_t, K_{t-i}, E_t) \qquad [1]$$

where D represents the size of the domestic market (the aggregate demand), C represents the relative unit costs (of the host country compared to the country of origin), B represents the potential trade barriers, K_{t-i} represents the volume of foreign capital at the start of the period analyzed and E[1] represents a group of factors that are external to the firm but which are capable of significantly influencing its levels of production

The empirical models that are concerned with the determinants of foreign investment usually consist of a generalized version of the theoretical model [1][2]. The specification of the empirical model normally involves using a multiple regression model, one which is usually log-linear (Bajo and Sosvilla, 1992; Muñoz,1999). Therefore, equation [1] can be written as:

$$LnIED_t = \beta_0 + \beta_1 LnD_t + \beta_2 LnC_t + \beta_3 LnB_t + \beta_4 LnK_{t-i} + \beta_5 LnE_t + \varepsilon_t \qquad [2]$$

where Ln represent natural logarithms.

There is a distinct lack of consensus, in the vast majority of empirical studies, as to the relative importance and the direction of the impact of the potential determinants of FDI. This suggests that the exact relationship between FDI and its determinants

[1] Porter (1986) and Esteban and Vives (1994) underline the fact that neither production nor productivity depend solely upon the level of physical capital and work but also upon other variables, factors that are external to the firms, such as the level of infrastructure, human capital, and technology.

[2]This generalization involves carrying out an extrapolation from the micro (or firm-level) to the macro (or country-level) and includes a number of determining factors which constitute a series of economic variables that might influence firms' costs and incomes and, in consequence, the decision to invest in the foreign country.

is essentially empirical. The aggregate demand or the size of the market of the country that receives the direct investment should have a positive influence on FDI (Billington, 1999; Chandprapalert, 2000; Love and Lage-Hidalgo, 2000; Chakraborty and Basu, 2002; Janicki and Wunnava, 2004). Although there is no complete consensus with respect to the empirical results obtained for relative unit costs, most of these results indicate that they have a negative influence on FDI (Chakrabarti, 2001). The effects of either openness or trade barriers on FDI have also been widely debated. The ease of entry to economic markets may be a factor that plays a role in the attraction of FDI (Root and Ahned, 1978); hence, it is to be expected that, in general, barriers to trade act as a negative stimulus to FDI (Mundell, 1957), although there are empirical studies that would seem to contradict this point of view): while Culem (1988) reported a significantly negative correlation between trade barriers and FDI, Lunn (1980) observed a positive relationship, and Blonigen and Feenstra (1996) found that trade barriers play an insignificant role in attracting FDI. Past decisions with respect to direct investment may also affect future flows of FDI, in this case positively, since they establish patterns of behaviour with respect to investment preferences. Finally, it is not known, a priori, what effects the group of factors that are external to the firms themselves will have; this will depend on the each individual factor. Factors such as infrastructure, technological and human capital should have a significantly positive effect on FDI.

3. EMPIRICAL ANALISIS

Data and variables

The study of the determinants of FDI in Spain may adopt at least two distinct approaches: the first of these involves considering the total aggregate investment for the whole of Spain and the second uses different levels of investment in order to study a regional or sectoral breakdown of FDI. The second approach also allows

the study to take advantage of the positive econometric effects that are derived from the use of panel data techniques[3]. In order to maximize these advantages, the determinants of foreign investment in Spain are analyzed by looking at a breakdown of the 28 sectors of the Spanish economy (set out according to the National Classification of Economic Activities, 1993). The 13 main manufacturing sectors are then analyzed and a third application is also carried out for the 17 Spanish Regions. The temporal period covered in the study spans the years 1993-2002.

The dependent variable used was gross effective investment which, in addition to accurately reflecting the flows of FDI, facilitates the sectoral and regional analysis of said investment. Hence, this empirical work uses the homogeneous series of Gross Effective Foreign Investment provided by Spanish Ministry of Economy (SME) since this is believed to be the best indicator of FDI.

A priori, there would seem to be a wide and varied array of potential factors, both intrinsic and extrinsic to the firms that might in some way affect the foreign firms' decisions to invest in any given country (see Muñoz, 1999). On looking at the FDI literature cited above and by taking equation [2], it may be deduced that the empirical model should include at least three types of FDI determinants: factors linked to the demand or the size of the market (D), factors that ultimately affect the firms' costs or profits –such as the group of factors C, B, E- and, to some extent, the previous decisions taken with respect to FDI (K_{t-i}). Table 1 therefore, provides a regional and a sectoral breakdown of the determinants of Spanish FDI.

INSERT TABLE 1 ABOUT HERE

[3] These techniques provide certain statistical and econometric advantages, advantages that are highlighted in the works of Hsiao (1986), Dielman (1989), Baltagi (1995), Matyas and Sevestre (1996) or Greene (1998) among others.

Specification of the models and results

The empirical analysis of the determinants of FDI, which utilizes a breakdown of the flows of investment received, in terms of productive sectors and autonomous regions, is estimated using panel data techniques. Therefore, if there is a panel of N sectors or regions, for T periods of time, the model [2], which does not consider specific temporal effects, may be expressed as follows:

$$LnFDI_{i\,t} = \alpha_{it} + \beta_i' LnX_{it} + \varepsilon_{it}\,; \qquad i=1,...N\,;\ t=1,...T \qquad [3]$$

where *Xit* and β_i are *k*-vectors of independent variables (determinants) and parameters respectively; α_{it} is the component which includes the specific characteristics (individual effects), and ε_{it} is the disturbance. The appropriate estimation method and the estimators' properties will depend on the characteristics of α_{it} and ε_{it} (and on the relation between them), as well as on the relation between the independent variables and the disturbance.

This work uses a panel of 252 observations for the temporal period of 1993-2002[4] when all of the 28 selected productive sectors are available. 117 observations are available when the 13 manufacturing sectors are analyzed and 153 for the 17 regions. The estimations are carried out using the Econometric Views program 5.0.

The first part of the study evaluates three alternative forms of modelling (3). The proposals for modelling using fixed or random effects[5] are not capable of adequately capturing heterogeneous or temporal performance or the performance

[4] In this paper, the properties of the time series that were used were not studied because the number of annual observations was relatively small. As Shiller-Perron (1985) and Davison-Mackinnon (1993) point out, the power of the unit root test basically depends upon the chronological span of the data. In order to guarantee that the resultant regressions are not spurious, the relationships established by existing economic theory and other empirical analyses within the same field are taken into consideration.

[5] The informatics system Econometric Views 5.0 has also been used in an attempt to include additional specific temporal effects. This option does not improve the results, rather, on combining the two types of effects (group and temporal), given the characteristics of the sample, tends to provoke situations in which there is perfect multicolinearity.

of different economic sectors or regions. The inclusion of a dummy variable (DU_{it}= α_{it}) in order to capture the heterogeneity across economic units and over time has, in general, functioned satisfactorily. In the case of the sectoral analysis, breaking the sample down into 28 sectors of activity for the Spanish economy, the model that has achieved the best results is as follows:

$$LnSECFDI_{it} = \beta_0 DU_{it} + \beta_1 Ln(SECPLP_{it} - SECCOST_{it}) + \\ + \beta_2 LnSECFDI_{it-1} + \beta_3 FISC_t + \beta_4 LnDM_{it} + \varepsilon_{it} \quad [4]$$

where SECFDI represents the FDI for each sector. Given the existence[6] of heteroskedasticity and the characteristics of the sample in which T<N, the most generic of the methods, SUR, cannot be applied. Hence the model [4] is estimated using the GLS (Cross Section Weights) method. The results of the estimation of this model are given in table 2.

The findings suggest that the model is robust. The adjusted-R^2 indicated good explanatory power. The reported F-statistic is substantial enough to conclude that there is joint significance of the chosen independent variables. The results indicate that the level of foreign direct investment according to sectors (SECFDI) depends on; the particularities of each sector (DU), the difference between the productivity of each employee and the cost of each employee (SECPLP-SECCOST)[7], on past decisions (SECFDI(-1)) –those sectors that proved to have the most attractive power in the past also tend to maintain this power in the present -, the fiscal pressure in Spain (FISC) and the capacity that the sectors have in order to keep their domestic markets supplied (DM). As one might expect, all of these variables, with the exception of FISC, take a positive sign. The first four variables are significant at the conventional level of 5%. The DM variable is significant at 19%.

[6] The Bartlett, Levene and Brown-Forsyhe tests indicated the presence of heteroskedasticity.
[7] The result of the individual inclusion of SECPLP and SECCOST in the model was not significant.

The 28 sectors analyzed are very heterogeneous and take in activities that vary substantially, both in terms of quantity and quality. Therefore, a specific analysis is carried out which looks at the 13 manufacturing sectors, i.e. those sectors that have most in common and those that focus on those processes of industrial transformation that are generally intensive. For the manufacturing sectors the following model provides the best results:

$$LnSECFDI_{it} = \beta_0 DU_{it} + \beta_1 Ln(SECPLP_{it} - SECCOST_{it}) + \beta_2 LnSECFDI_{it-1} + \\ + \beta_3 FISC_t + \beta_4 LnDM_{it} + \beta_5 LnSPCPI_t + \beta_6 LnSECEXP_{it} + \varepsilon_{it} \quad [5]$$

The model [5] is also estimated using the GLS (Cross Section Weights) method and the results are given in table 2. On utilizing the data relevant to the industrial branches alone, the significance of the variables included in model [4] is, once again, thrown into sharp relief. The one exception is the FISC variable which stops being statistically significant in explaining the behaviour of SECFDI[8]. Within the same context however, the analysis reveals that the SPCPI variable (prices in Spain compared to the EU average) is highly significant (and logically takes a negative sign), as is the SECEXP variable, which reflects the level of exports generated by the industrial sub-sectors and, to a certain extent, measures how competitive they are.

The capacity of a country to attract FDI may be measured in a disaggregate way by measuring the investment in its economic sectors or by considering the geographical location of the country within which this investment is taking place. In the case of the latter, the methodology involves trying to determine those factors that exist in a given zone that convince foreign firms to set up there. It is within this

[8] To a certain extent, this indicates that, when foreign investment by companies holding foreign stocks is not included, as is the case of the manufacturing sectors, this variable ceases to be significant. This is because the main factor underlying the rise of this type of investment, which has an important relative weight as a proportion of total foreign investment, has been the fiscal incentives that Spain has offered with respect to the incomes obtained through foreign business investments (Tax Law of Companies, 43/1995).

line, therefore, that a model is offered which is similar to that provided in equations [4] and [5], but one which has been adapted for the Spanish scenario in which there are 17 quasi-autonomous regions:

$$LnRFDI_{it} = \beta_0 DU_{it} + \beta_1 Ln(RPLP_{it} - RCOST_{it}) + \beta_2 LnRFDI_{it-1} + \beta_3 FISC_t + \\ + \beta_4 LnRGDP_{it} + \beta_5 LnSPCPI_t + \beta_6 LnRHK_{it} + \beta_7 DUM_t + \varepsilon_{it} \quad [6]$$

where RFDI represents regional FDI. Model [6] is also estimated using the GLS (Cross Section Weights) method and the results are given in table 2. The results of the model [6] vindicate those obtained in former studies in the sense that the level of foreign direct investment according to region (RFDI) depends on the particularities of each region (DU), the difference between the value of the productivity per employee and the cost of each employee (RPLP-RCOST), on past decisions (the regions with the greatest power to attract FDI in the past continue to exert this power in the present) and demand factors, represented by the RGDP of each region. Of the two national Spanish variables, FISC and SPCPI, it is the SPCPI variable that reveals itself as being the most statistically important in explaining investment. The model [6] provides information which is not contained in [4] and [5] since the results indicate that regional human capital has a positive effect on attracting investment, an effect that is statistically significant at the 12% level as opposed to 5%. This is probably due to the fact that a part of its effect has already been captured by the partial labour productivity variable. On a regional level, Madrid must be modelled slightly differently, since it receives a particularly high relative proportion of investment. This is achieved by introducing a dummy variable for the region (DUM). The variable is significant at the 5% level and confirms the importance of Madrid as a national service centre.

INSERT TABLE 2 ABOUT HERE

If the endogeneity of the lagged dependent variable (FDI(-1)) is taken into account, then the GLS (Cross Section Weights) method becomes inappropriate and an instrumental variables method must be used. Potential methods include; the Two-Stage Least Squares (2SLS), the Weighted Two-Stage Least Squares (W2SLS) and the Three-Stage Least Squares (3SLS) methods. Given that this study uses panel data, the W2SLS is used. The W2SLS is an appropriate technique when some of the right-hand side variables are correlated with the disturbance term and the model is heteroskedastic. The estimation of the models [4], [5] and [6] by means of the W2SLS method is given in table 2, in which the variable FDI (-2) is used as an instrument of FDI (-1).

INSERT TABLE 3 ABOUT HERE

The results presented in Table 3 vary slightly with respect to the earlier estimates presented in Table 2. One of the only really substantial differences is the improvement in the statistical significance of the human capital (HK) and relative fiscal pressure (FISC) variables, when the estimation is carried out by means of the W2SLS method in model [6].

4. CONCLUSIONS AND POLICY IMPLICATIONS

The vast majority of empirical studies analyzing the determinants of foreign investment in Spain have tended to focus upon macroeconomic factors and to a lesser extent on regional factors. This study looks jointly at macroeconomic, regional and sectoral factors.

The demand factors (DM and RGDP) have, in general, been statistically significant. This result is in line with those obtained by Egea and López (1991b), Bajo and Sosvilla (1992), Muñoz (1999) and Díaz (2001).

It should be underlined that, in the three models estimated in this study, the variable that takes in the difference between the productivity of labour and its cost

plays a key role in explaining the behaviour of FDI. This result both clarifies and, reaffirms the results obtained in similar studies, in the sense that it quite clearly shows that firms are motivated, not solely by the evolution of labour costs, but by the relative difference between labour productivity and labour costs.

Human capital, which is a fundamental element of increased per-worker labour productivity, when considered individually, is also a significant determinant of foreign investment in the different regions.

In addition to productivity, a further indicator of competitiveness is the export potential of the manufacturing sectors, which clearly reveals itself to positively influence the entry of flows of foreign investment.

Of all of the macroeconomic factors utilized that measure the situation of Spain with respect to the EU average (SPGDP, FISC, SPLTIR, SPCPI and SPIPI), the two which, in general, have been statistically significant and take a negative sign in the definitive models estimated by W2SLS were, fiscal pressure (FISC) and the inflation differential (SPCPI).

Fairly predictably, the sectoral or regional determinants have performed better than those that work on the national Spanish level (the specific factors have been shown to be relatively more important than macroeconomic factors). This result is in line with those obtained by Giulietti, Mccorriston and Osborne (2004).

In view of the results, it would seem evident that economic policy in Spain orientated towards attracting foreign direct investment, besides taking into account the traditional factors of demand and costs should focus on boosting all of those variables that favour the growth of labour productivity as is the case of investment in education, research, innovation and technology.

REFERENCES

Bajo, O. (1991) Determinantes macroeconométricos y sectoriales de la inversión extranjera directa en España, *Información Comercial Española*, **696/697**.

Bajo, O. and S. Sosvilla (1991) Modelling foreign direct investment in Spain, 1961-1988: An application of cointegration analysis, paper presented in the European Meeting of the Econometric Society, Cambridge.

Bajo, O. y S. Sosvilla (1992) Un análisis empírico de los determinantes macroeconómicos de la inversión extranjera directa en España, 1961-1989, *Información Comercial Española*, *Moneda y Crédito*, **194**, 107-136.

Bajo, O. and S. Sosvilla (1994) An econometric analysis of foreign direct investment in Spain, 1964-1989, *Southern Economic Journal*, **61**, 104-120.

Baltagi, B. (1995) *Econometric Analysis of Panel Data*. John Wiley and Sons. New York.

Barrell, R. y N. Pain (1991) An econometric analysis of US foreign direct investment, paper presented in the *European Meeting of the Econometric Society.*

Billington, N. (1999) The Location of Foreign Direct Investment: An Empirical Analysis, *Applied Economics*, **31**, 65-76.

Bloningen, B. A. and R. C. Feenstra (1996) Effects of U.S. Trade Protection and Promotion Policies, National Bureau of Economic Research (Cambridge, M. A.) Working Paper nº. **5285**.

Chakrabarti, A. (2001) The Determinants of Foreign Direct Investment: Sensitivity Analysis of Cross-Country Regressions, *KYKLOS*, **54 (1)**, 89-114.

Chakraborty, C. and P. Basu (2002) Foreign direct investment and growth in India: a cointegration approach, *Applied Economics*, **34**, 1061-1073.

Chandprapalert, A. (2000) The Determinants of U.S. Direct Investment in Thailand: A Survey on Managerial Perspectives, *Multinational Business Review*, **8(2)**, 82-88.

Culem, C. G. (1988) The Locational Determinants of Direct Investments Among Industrialized Countries, *European Economic Review* **32**, 885-904.

Davinson, R., and J. MacKinnon (1993) *Estimation and Inference in Econometrics*, New York: Oxford University Press.

Díaz, R. (2001) *Inversión extranjera directa en España. Patrón de localización regional*. PhD Thesis. Universidad de Vigo.

Dielman, T., (1989) Pooled cross-sectional and Time Series Data Analysis, Marcel-Dekker, New York.

Donges, J. (1976) *La industrialización en España. Políticas, logros, perspectivas*. Oikos-Tau. Barcelona.

Egea, M. P. y C. López (1991) Un estudio sobre la distribución geográfica de la inversión directa en España, *Información Comercial Española,* **696/697**.

Esteban, J. M. y Vives, X. [directores] (1994) *Crecimiento y convergencia regional en España y Europa*, Instituto de Análisis Económico, **Vol. 1-2**.

Felipe, J. y P. Fernández (1991) Un modelo de la balanza de capitales española, paper presented in the *V Meeting Asepelt-España*, Las Palmas de Gran Canaria.

Giulietti, M.; Mccorriston, S. and P. Osborne (2004) Foreign direct investment in UK: evidence from a disaggregated panel of UK food sector, *Applied Economics*, **36**, 653-663.

Greene, W., (1998) *Análisis Econométrico*, Prentice-Hall, Madrid.

Hsiao, C.(1986) *Analysis of Panel Data*, Cambridge University Press, New York.

INE (Several years), *Series estadísticas,*. Spanish Statistical Institute (SSI), Madrid

Janicki, H. P. and P. V. Wunnava (2004) Determinants of foreign direct investment: empirical evidence EU accession candidates, *Applied Economics*, **36**, 505-509.

Love, J. H. and F. Lage-Hidalgo (2000) Analysis the determinants of US direct investment in Mexico, *Applied Economics*, **32**, 1259-1267.

Lunn, J. (1980) Determinants of U. S. Direct Investment in the E. E. C.: Further Evidence, *European Economic Review*. **13**, 93-101.

Matyas, L., and Sevestre, P. (1996) *The Econometrics of Panel Data: Handbook of Theory and Applications*, Kluwer Academic Publishers, Dordrecht.

Muñoz, M. (1999) *La inversión directa extranjera en España: Factores determinantes*, Civitas, Madrid.

OECD (Several years) *National Accounts and Historical Statistics*.

Porter, M. E. (1986) Competition in global industries: A conceptual framework, in *Competition in global industries*, Harvard Business Scholl Press, Boston.

Root, F. R. and Admed, A. A. (1978) The Influence of Policy Instruments on Manufacturing Direct Foreign Investment in Developing Countries, *Journal of International Business Studies*, **9 (Winter),** 81-93.

Shiller, R. J. and P. Perron (1985) Testing the random walk hypothesis: power versus frequency of observation, *Economics Letters*, **Vol. 18**, 381-386.

Spanish Ministry of Economy (Several years) *Foreign investment series*.

Spanish Ministry of Economy (Several years) *Foreign trade series*.

Spanish Ministry of Science and Technology (SMCT) (Several years) *Prices series*

Stevens, G. y R. Lipsey (1992) Interactions between domestic and foreign investment, *Journal of International Money and Finance*, **11**.

Varela, F. y J. Rodríguez de Pablo (1974) Las inversiones extranjeras en España: 1959-1974. Una vía al desarrollo, *Información Comercial Española*, **493**.

TABLES

Table 1. The possible determinants of FDI

Variable	Description	Unit/Source
	Factors of demand (Market size)	
SPGDP	Real Gross Domestic Product (GDP) in Spain	Thousand of euros /Spanish Statistical Institute (SSI)
SPEGDP	GDP in Spain compared to the EU average	Percentage/ EUROSTAT
RGDP	Real GDP of the Spanish regions	Thousands euros /SSI
DM	The proportion of sectoral production that is destined for the domestic market	Percentage/SSI
	Factors of cost (profit)	
SPCOST	Mean cost per employee on average throughout Spain	Euros/SSI
RCOST	Mean cost per employee on average in each region	Euros/SSI
SECCOST	Mean cost per employee on average according to sector	Euros/SSI
SPPLP	Partial Labour Productivity on average in Spain	Euros/SSI
RPLP	Partial Labour Productivity, on average, according to region	Euros/SSI
SECPLP	Partial Labour Productivity according to sector	Euros/SSI
SUBS	Production subventions, made available by the Spanish Public Administration	Millions euros /SSI
FISC	Fiscal pressure (Direct and indirect taxes/GDP) in Spain compared to the EU average	Percentage/ OECD
SPLTIR	Long term interest rate in Spain compared to the EU average	Percentages/ EUROSTAT
SPCPI	Consumer price index in Spain compared to the EU average	Percentages/Spanish Ministry of Science and Technology (SMCT)
SPIPI	Index of industrial prices in Spain compared to the EU average	Percentages/ SMCT
RHK	Human capital according to region (percentage of employees with upper-secondary education level or over)	Percentage/SSI
SECHK	Human capital according to sector (percentage of employees with upper-secondary education level or over)	Percentage/SSI
SPPK	Public capital in Spain (as a proxy of the level of infrastructures)	Millions euros/SSI
TEC	Ratio of income, as measured on the Spanish technological balance of payments, to GDP (as a proxy of technological capital)	Percentage/SSI
	Previous FDI decisions	

$RFDI_{t-1}$	The one-period lagged dependent variable according to region (as proxy of the volume of FDI at beginning of period)	Millions euros/ SME
$SFDI_{t-1}$	The one-period lagged dependent variable according to sector (as proxy of the volume of FDI at beginning of period)	Millions euros/ SME
	Other location factors	
SECEXP	Exports by sector (as competitiveness indicator)	Millions euros/ SME
RPS	Productive structure by region, measured as a ratio between industrial Gross Value Added (GVA) and the total GVA of a region	Percentage/SSI

Table 2. Estimates of the models 6, 7 and 8. Method: GLS (Cross Section Weights)

Dependent Variable: Ln(?FDI)			
Independent Variable	**Model[6] (Total sectors)**	**Model [7] (Manufacturing sectors)**	**Model [8] (Regions)**
DU	1.094439 (10.59514)*	1.111707 (10.56652)*	1.122849 (7.330527)*
Ln(?PLP-?COST)	0.105245 (2.107667)*	1.311781 (9.171453)*	0.543657 (2.216901)*
Ln(?FDI(-1))	0.844293 (32.46423)*	0.327381 (5.030839)*	0.654079 (10.17201)*
Ln(FISC)	-2.043291 (-2.053786)*	-1.096478 (-0.372633)	-3.481905 (-0.892265)
Ln(DM)	0.941128 (1.339398)	4.723175 (2.960093)*	
Ln(SPCPI)		-1.559847 (-7.248110)*	-3.992940 (-3.845437)*
Ln(SECEXP)		0.823760 (6.4821671)*	
Ln(RGDP)			0.564193 (5.290689)*
Ln(RHK)			1.168325 (1.575153)
DUM			0.467840 (1.987841)*
Nº. of obser.	252	117	153
Adjusted R^2	0.97	0.98	0.98
D-W	2.262	1.945	2.072
F-statistic **Prob.(F-stat.)**	1900.7 0.00	914.1 0.00	869.1 0.00

Notes: 1. (?) Is substituted for (SEC) or (R) depending on whether the analysis refers to the sector or the region

2. t-ratio appear in parenthesis
3. (*) Indicate significance at the 5% level

Tabla 3. Estimates of the models 6, 7 and 8. Method: W2SLS

Dependent Variable: Ln(?FDI)			
Independent Variable	**Model[6] (Total sectors)**	**Model [7] (Manufacturing sectors)**	**Model [8] (Regions)**
DU	1.157284 (10.11943)*	1.259680 (9.895546)*	1.079991 (8.204694)*
Ln(?PLP-?COST)	0.104908 (1.983177)*	1.308470 (8.805573)*	0.542123 (2.256655)*
Ln(?FDI(-1))	0.838355 (30.16488)*	0.353388 (5.187197)*	0.679374 (10.78925)*
Ln(FISC)	-2.170680 (-2.10291)*	-1.892702 (-0.641471)	-8.931114 (-2.469780)*
Ln(DM)	0.900402 (1.210291)	4.977487 (3.086278)*	
Ln(SPCPI)		-1.664194 (-6.885075)*	-4.109263 (-4.496141)*
Ln(SECEXP)		0.851385 (6.235611)*	
Ln(RGDP)			0.542434 (5.420707)*
Ln(RHK)			1.537551 (2.307189)*
DUM			0.489287 (20.83538)*

Notes: 1. (?) Is substituted for (SEC) or (R) depending on whether the analysis refers to the sector or the region

2. t-ratio appear in parenthesis
3. (*) Indicate significance at the 5% level